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(54) **Insulated bearing assembly in a traction motor for electric rolling stock**

(57) Running gear for electric rolling stock has a traction motor 17 whose rotor shaft is arranged to have at least a portion at which the shaft bearing 15 makes contact made of an electrically insulating material 19. The electrically insulating material prevents erosion of the bearing by the electric current supplied to the axles 3.

FIG. 3

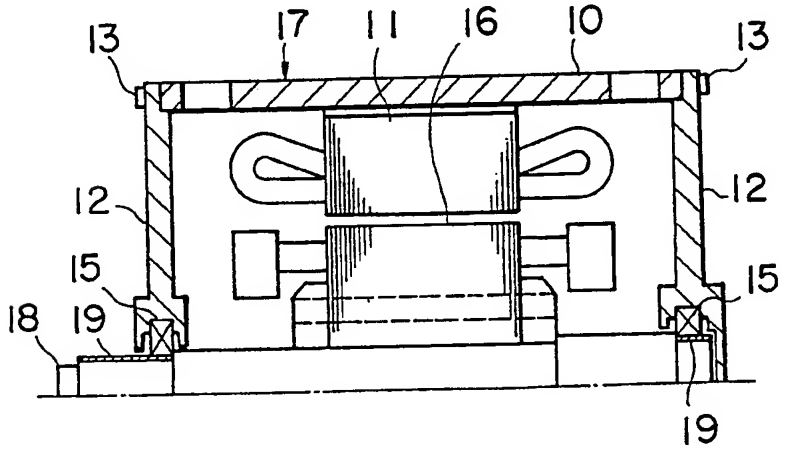

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FIG. 1

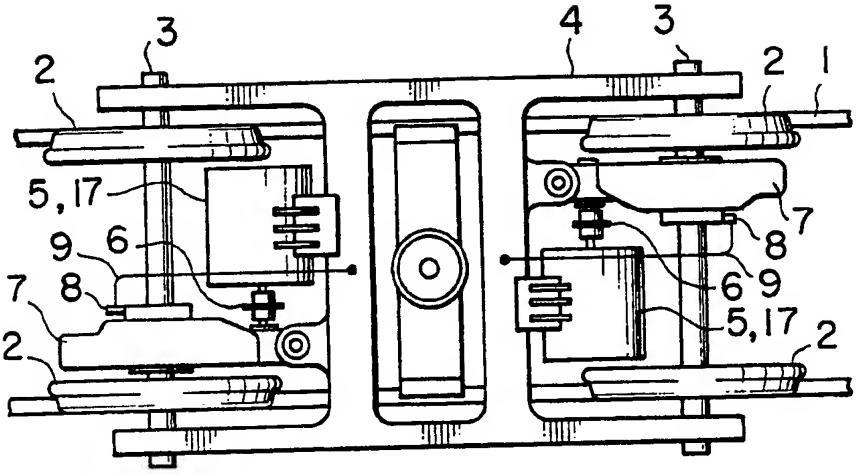


FIG. 2

PRIOR ART

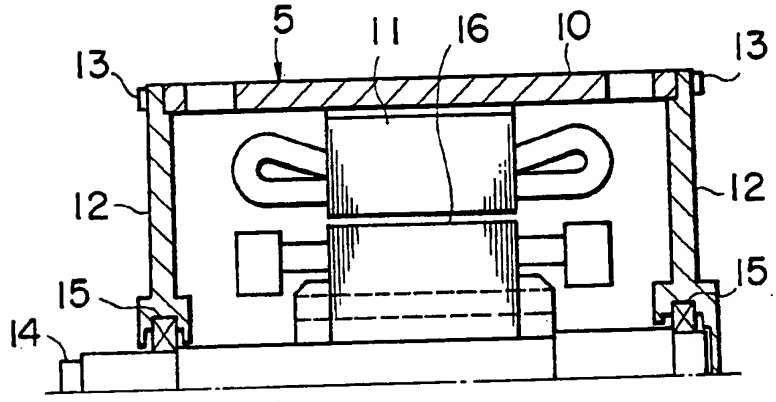
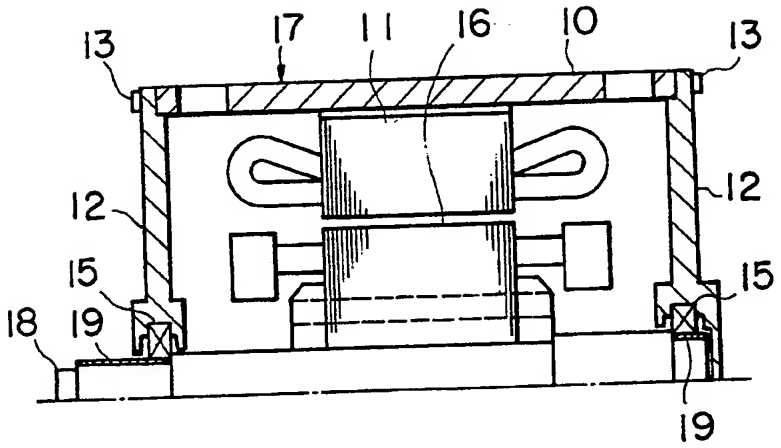


FIG. 3



RUNNING GEAR FOR AN ELECTRIC ROLLING STOCK

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a running gear for an electric rolling stock, and, more particularly, to a running gear for an electric rolling stock capable of preventing electric erosion of the traction motor thereof.

Description of the Related Art

Fig. 1 is a plan view which illustrates an essential portion of a conventional running gear for an electric rolling stock. Referring to the drawing, wheels 2 capable of running on a track 1 are integrally secured to the corresponding two ends of axles 3. A pair of axles 3 is supported by a bogie transom 4 with an axle box (not shown). Traction motors 5 are mounted on this bogie transom 4, thus, the rotation therefrom being transmitted to the axles 3 through coupling devices consisting of gear coupling 6 and reduction devices 7. Contacts 8 are arranged to be brought into contact with the axles 3. The electric connection is established by grounding lines 9 between these contacts 8 and the bogie transom 4. An end of a coil of the armature of the traction motor 5 is also connected to the corresponding contact 8.

In the thus-structured running gear, an electric current introduced to the traction motor 5 from a stringing (omitted from illustration) through a pantegraph passes through a route formed between contacts 8 and the track 1 via the axles 3 and wheels 2.

The conventional running gear is structured as described above and an electric current is arranged to be introduced into the axles 3 through the contacts 8. Therefore, when the contact resistance of the contact 8 increases, an electric current passes to the bearing means of the traction motor 5 due to the potential difference generated to the product of this contact resistance and the above-described electric current. As a result, electric erosion generates, causing the bearing to be damaged.

Then, this phenomenon will be described with reference to Figs. 1 and 2.

Fig. 2 is a partial cross-sectional view of an electric motor, for example, the traction motor 5. Referring to the drawing, a frame 10 is secured to a bogie transom 4, this frame 10 indluding a stator 11. A bearing box 12 is fastened with bolts 13 to the two end of the frame 10. Bearing means 15 are secured to the front portions of the bearing box 12. A rotator shaft 14 to which a stator 16 is secured can be rotatably held by the bearing means 15. The traction

motor 5 is, at the frame portion 10 thereof, secured to the bogie transom 4, and the rotator shaft 14 of the traction motor 5 is connected to a gear coupling 6.

Therefore, a closed circuit: the contact 8 - axle 3 - reduction device 7 - gear coupling 6 - rotator shaft 14 - bearing means 15 - bearing box 12 - frame 10 - bogie transom 4 - grounding line 9 - contact 8 is present so that a portion of the above-described contact potential difference is arranged to be applied to the bearing means 15. When the contact potential difference is small level, the bearings means 15 maintains its insulation by the oil film thereon. However, when this contact potential difference exceeds a certain level, the above-described insulation is lost, causing an electric current to be supplied to the bearings means 15. As a result, electric erosion is generated.

SUMMARY OF THE INVENTION

The present invention is established in order to overcome the above-described problem. An object of the present invention therefore is to obtain a running gear for an electric rolling stock in which electric erosion of the bearing means of the traction motor due to the supply of electricity to the axles can be prevented.

In order to achieve the above object, according to one aspect of the present invention, there is provided a running gear for an electric rolling stock comprises:

a bogie transom; axles rotatably supported by the bogie transom, the axles having wheels secured thereto; a traction motor having a frame secured to the bogie frame, bearing means secured to the frame and a rotator shaft supported by the bearing means; a coupling device capable of transmitting rotation of the rotator shaft of the traction motor to the axles; and a grounding device capable being brought into contact with the axles and establishing passages through which an electric current can flow between the axles and the bogie transom, wherein at least a portion of the rotator shaft of the traction motor which is positioned to contact with the bearing means is made of an electrically insulating material.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view which illustrates a running gear for an electric rolling stock according to the conventional and present invention;

Fig. 2 is a partial cross-sectional view which illustrates a traction motor for a conventional running gear for an electric rolling stock; and

Fig. 3 is a partial cross-sectional view which illustrates a traction motor for a running gear for an electric rolling stock according to an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A running gear for an electric rolling stock according to the present invention, as shown in Figs. 1 and 3, comprises: a bogie transom 4; axles 3 rotatably supported by the bogie transom 4 and having wheels 2 fitted thereto; electric motors such as traction motors 17 secured to the bogie transom 4; coupling devices consisting of gear coupling 6 and reduction devices 7, the coupling devices capable of transmitting the rotation of rotators 18 of the traction motors 17 to the axles 3; and grounding means, for example, grounding lines 9 which establish passages through which an electric current passes between the axles 3 and the bogie transom 4.

The traction motor 17 includes: a frame 10 secured to the bogie transom 4, the frame 10 having a stator 11 secured thereto; bearing means 15 provided in a bearing box fastened at the two ends of the frame 10 by bolts 13; and a rotator shaft 18 rotatably held by the bearing means 15, the rotator shaft 18 having a rotator 16 secured thereto and the rotator shaft as well being connected to the coupling device. The difference from the conventional running gear shown in Fig. 2 lines in a rotator shaft 18. That is, the rotator shaft 18 has an insulating layer 19 which serves as an electrically insulating material in the

portion thereof at which the bearing means 15 comes contact. This insulating layer 19 needs to exhibit sufficient electricity insulating strength and also needs to exhibit sufficient mechanical strength so as to serve as the rotator shaft 18. Therefore, it is preferable to employ a structure that is arranged such that alumina or titanium ceramic film is formed to have a thickness about 0.5 mm by a molten liquid spray method. However, the film thickness of the level described above is sufficient to create a resistance of several tens MΩ or more. Therefore, a sufficient difference from the contact resistance (about several tens of mΩ to few hundred of mΩ) at the contact 8 can be assured. Therefore, when contact resistance of the contact 8 is increased and a high voltage is thereby applied between the frame 10 of the traction motor 17 and the rotator shaft 18, the large portion of the above-described voltage is applied to the insulating layer 19, causing the bearing means 15 to be protected from the application of the voltage. As a result, its insulation can be maintained. Consequently, the electric erosion of the bearing means 15 can be prevented.

The material and the shape of the insulating layer 19 is not limited to those according to the above-described embodiment. It can be variously

selected. For example, the overall body of the rotator 18 may be made of, for example, ceramics.

Claims.

1. A running gear for electric rolling stock comprising:

a bogie frame;

axles rotatably supported by said bogie frame, said axles having wheels secured thereto;

a traction motor having a motor frame secured to said bogie frame, bearing means secured to said motor frame and a rotor shaft supported by said bearing means;

a coupling device capable of transmitting rotation of said rotor shaft of said traction motor to said axles; and

grounding means capable of being brought into contact with said axles and establishing pathways through which an electric current can flow between said axles and said bogie frame, wherein

at least a portion of said rotor shaft of said traction motor which is positioned to contact with said bearing means is made of an electrically insulating material.

2. Running gear according to claim 1 wherein said electrically insulating material comprises alumina or titania ceramics.

3. Running gear according to claim 2 wherein said alumina or titania ceramics are prepared by a liquid spraying method.

4. Running gear according to claim 2 or 3 wherein the thickness of said ceramics is about 0.5mm.

5. Running gear according to claim 1, 2, 3, or 4 wherein the resistance of said electrical insulating material is several tens of Maor more.

6. Running gear according to any preceding claim wherein the overall body of said rotor is made of ceramics.

7. Running gear for electric rolling stock, substantially as herein described with reference to Figure 3 of the drawings.

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